THE PLASMA LENS COLLABORATION has achieved something that’s never been done before. It recently (April 2000) accomplished the focusing of a positron beam (antimatter of electron) by means of a plasma lens. This is the first time this process has been observed anywhere, and it is an example of focusing an antimatter beam with matter. It creates a potentially important application for future linear colliders. For example, a plasma lens located at the interaction point inside a detector could focus both the electron and positron beam, thereby reducing the beam spot size and thus increasing the luminosity, perhaps by an order of magnitude or more. These may be important considerations in the design of the NLC. Experiment E-150 Plasma Lens Collaboration contains members from four laboratories and three universities (see complete list at end of article).

The process started with a positron beam from the PEP-II positron source in Sector 19. The beam was transported back toward the injector, sent through the damping ring and then accelerated to an energy of 28.5 GeV with 1 to 2 x 10^10 e^-/bunch. This beam was delivered through the beam switchyard to the Final Focus Test Beam Facility (FFTB) at a rate of 1 to 10 Hz.

At the focal point of the FFTB transport, a special plasma chamber was installed. It contains a 3 mm diameter pulsed gas nozzle through which either hydrogen or nitrogen gas is “puffed” into the vacuum system at high pressures (250 to 1100 pounds per square inch).

The gas is removed from the plasma chamber by a vacuum pump. On either side of the central chamber are sections semi-isolated from each other by thin titanium windows that have small (2 to 5 mm diameter) openings for the positron beam to pass through. This arrangement allows operation of the plasma lens with ultra-high vacuum systems on either side. The plasma lens was then generated by ionizing the gas with an infrared laser.

"The theory of plasma lens focusing was first proposed by Pisin Chen in 1987," said project manager Dieter Walz, "so we have an accelerator theorist who is also a co-spokesman for the experiment."

The relativistic positron beam carries both charge and current. In a vacuum the electric repulsion of the positrons is nearly neutralized by the magnetic attraction among the particles. If this beam enters into a plasma, the charge is neutralized primarily by the fast motion of the plasma electrons. The current is neutralized due to the development of the “return current” in the plasma. Adds Walz, "In typical high-energy beams, we’ve found that such current neutralizations tend to be not effective." This results in large electromagnetic fields that can self-focus the beam. The reduction in beam spot size was measured using a wire scanner with 4 micron and 7 micron thick carbon fibers.

A second, independent method to measure the strength of the plasma lens is a segmented

(Continued on Page 5)
As you may have heard by now, SLAC was honored by the community recently for being a good neighbor. We received the Golden Acorn award for community service from the Menlo Park Chamber of Commerce at an awards dinner on May 11. The award recognized the efforts of many of you in the areas of education, charity and public service.

In recognition of the award we received a Letter of Congratulations from Senator Diane Feinstein, a Certificate of Appreciation from Senator Barbara Boxer, a Certificate of Special Congressional Recognition from Congresswoman Eshoo, a Letter of Congratulations from California Governor Gray Davis, a Certificate of Recognition from State Senator Byron Sher, a Certificate of Recognition from Assemblyman Ted Lempert, and a Commendation from the San Mateo County Board of Supervisors. We’re delighted that our award garnered so much attention.

Education has been a prime target for many of our community activities. One-third of the 10,000 visitors who tour SLAC each year are school-aged children. SLAC donates surplus equipment to public schools for reuse and recycling. Scientists, engineers and others routinely donate time to schools as guest speakers. The Task Force on communications recognizes that these are all extremely valuable contributions to the community and they will be looking for ways to increase and improve on our outreach efforts.

SLAC staff members are also very charitable. Throughout the year, many of you contribute to the Stanford Blood Bank, which is of great benefit to the community. Nina Stolar and the Public Affairs staff keep those drives running smoothly. The food and toy drive each holiday season nets close to 1000 pounds of food and several boxes of toys for the needy, and we can thank Mary Parish for her many years of service in that arena. Frequent travelers have collected hotel-size shampoos and soaps that are then donated to Menlo Park organizations such as Haven House, a transitional shelter for the homeless, and the Boys and Girls Club. Last year the Boys and Girls Club used these supplies for their annual summer camping trip. Our thanks to the Travel Office staff for their help in this effort.

Our Housing Office has been an important part of our community relations. Ute Hayes, Joan Parker and Toni Campos work closely with our neighbors, to find the right match between the type of rooms offered for rent and the many different types of users we have visiting SLAC from all over the world. At the awards dinner, I met several people in the community who complimented our Housing Office for their courtesy and our users for their consideration. The job of the Housing Office has become more difficult in the past few years and we are appreciative of their skill and expertise under such competitive circumstances.

I know that many of you contribute an enormous amount of time and effort in your local areas in religious organizations, environmental groups and professional societies. I am proud that our community has acknowledged us for our work and I look forward to implementing new activities in the community with your help.

IN A SPECIAL CEREMONY in the Director’s Office, Gene Alvarado was presented with a beam tree in recognition of his 30 years of service. Alvarado joined the SLAC Facilities Department in 1990, after previously serving on Stanford Campus for 20 years as a custodian at Tressider. Alvarado was promoted in 1995 to a supervisor role where he directs, schedules and oversees a team of eight custodians at the Lab. He has also been selected for special recognition for extraordinary job performance while at SLAC. Congratulations, Gene!

Jan Dolan, Menlo Park City Manager, won the award for Outstanding Professional of the year.

You can't see Debra Zumwalt behind the hair, but she is entertaining her audience with stories about her neighbor (Joe Montana). (l-r) Edward Moore, Patricia Muhlestein, John Muhlestein (DOE Site Office). Zumwalt is General Counsel at Stanford.

(l-r) Larry Horton, Director of Government and Community Relations for Stanford University, Mary Jo Borak, Mayor of Menlo Park, and SLAC Director Jonathan Dorfan.

Jonathan and Renee Dorfan listened attentively to the accomplishments of the other award winners.
THE SLAC GARDEN CLUB has been around since the 1960s, although nobody seems to recall the exact date it started. According to Finn Halbo, the first garden site was where SCS (Building 50) now stands. The garden then relocated to a former steel storage yard in a valley below the location of the current Training Center (Building 272). Georgia Row recalls how Halbo helped label and organize about 70 20x20 feet garden plots. “Some profit from soda vending machines was used to start the garden,” recalled Halbo.

The third garden site was between SLAC Stores and Addison Wesley. This was by far the largest site, spanning about 150 10x20 foot plots. “I estimate that the garden moved there in 1979,” says Adele Panofsky.

In 1994, the garden was again displaced when Addison Wesley developed the site for new buildings. After lengthy negotiations, the club was able to secure the land behind the Training Center. A clause in the Bargaining Unit contract entitled each employee to a garden plot upon which to grow crops. Even with financial support from Addison Wesley and SLAC, the garden could not have been created without the tireless help of Rudy Malimban (currently retired), who spent many hours clearing the dense shrubbery and installing plumbing. Club members also spent a number of weekends reconditioning the soil at this former landfill.

Throughout the years, garden club organizers included Herb Weidner, Walt Inman, Roxanne Jones, Adele Panofsky, and now the self-named “default club president,” Ruth McDunn. “I’ve been trying for years to find someone else to do the job,” says McDunn. “I’ll handle the recordkeeping, if someone else will manage the plot assignments, annual compost purchase and delivery,” she added.

One reason gardeners enjoy tending their plots is that they reap what they sow. “I like the idea of having freshly grown vegetables,” says Yo Wackerman. “Some fruits and vegetables taste really different from store-bought, such as tomatoes and swiss chard.”

Others like Ramona Theobald, who has a plot filled with multi-colored flowers, take advantage of SLAC’s warm climate and spaciousness. “My garden at home is shaded, so at SLAC I can get different varieties,” Theobald adds.

The health benefits of gardening are also another draw. “I notice that I am healthier during the summer when I’m out working in the garden,” says Raffa Miranda, adding that “eating fresh strawberries and raspberries fortifies my immune system.” Peggy Tank also states, “(Gardening) is the best medicine for stress.”

Many gardeners try to be organic, preferring not to use pesticides or other chemicals on their plots. When asked why she is an organic gardener, Tank replied, “The greatest grower is nature.”

SLAC gardeners also use their harvest in a number of valuable ways. “I give (extra produce) to my elderly neighbors or donate to Second Harvest Food Bank, which provides frozen and fresh food to soup kitchens, elderly, and other communities,” says Dennis Norris.

For more information on the SLAC Garden and general gardening tips, check out the Garden website. (http://www-project.slac.stanford.edu/garden)

–Lily Wong

**SLAC Health Fair**

The SLAC Medical Department is excited to present the SLAC Health, Safety and Ergonomics Fair on June 14, 2000 from 10:00am to 2:00pm. We need volunteers to assist vendors from 9:30am to 2:30pm. No heavy lifting is required. Please contact Debbie Alwyn at Ext. 4588.
Plasma Focusing (Continued)

The plasma lens concept also works if there is no pre-ionization by the laser. This process is called self or impact ionization. In this case, the head of the positron bunch ionizes the gas and the remainder of the bunch is then focused. Since the head of the bunch is not focused, the efficiency in spot size reduction is not as high as for the laser pre-ionization. The two graphs depict plasma focusing for a hydrogen and a nitrogen lens, for laser and self ionizations. The decrease in beam size was approximately a factor of 2 for nitrogen. The reduction in orthogonal dimension was comparable, i.e., the reduction in spot size was approximately a factor of 4 for this case. The maximum possible spot size decrease is much higher, but the beam current had to be lowered and the incoming beam size enlarged in order not to melt the fragile carbon fibers in the wire scanner on account of the very high energy density of the focused beam.

“The collaboration is excited about potential future applications of this concept and is also planning on repeating this experiment, using electron beams focused by a laser ionized plasma,” said Walz.

The members of the collaboration, by institution, are as follows: FNAL (C. Crawford, R. Noble), KEK-Japan (K. Nakajima), LLNL (H. Baldis, P. Bolton), SLAC (P. Chen, W. Craddock, F.-J. Decker, C. Field, R. Iverson, F. King, R. Kirby, J. Ng, P. Raimondi, D. Walz), Hiroshima University—Japan (A. Ogata), UCLA (D. Cline, Y. Fukui, V. Kumar), University of Tennessee (A. Weidemann). Co-spokesmen are Baldis, Chen and Cline.

Talk, Walk, and Clean A Big Success

“WE REALLY WANT TO thank those folks who thought ahead and ordered pallets. That made the job easier,” said Leslie Normandin in Property Control. This year’s Talk, Walk and Clean was a big success given the great participation, the positive morale and the volume of stuff collected. Salvage picked up equipment, furniture, and materials, some of it quite ancient. In addition to all the stuff collected, trashed or recycled, there were a good number of lessons learned and success stories.

“We still have to sort the recyclables,” said Normandin. “Unfortunately, there was trash mixed in with recyclable materials. In one box we even found open exacto knives,” she said. Such situations meant extra time and effort in sorting.

In other cases there were unidentified liquids, lead and batteries. A reminder to staff members that these types of items need to be disposed of through the Waste Management Department. Salvage continues to work with some departments by picking up, sorting and disposing remaining discarded material.

One thing to keep in mind for the future: you don’t have to wait for annual cleanups. Turn in equipment and computers as soon as they are identified as excess. Then SLAC has a higher success rate donating them to public schools or other non-profit groups.

Enthusiasm was the story of the day. Hats off to the energetic group led by Perry Anthony in EFD. They found 57 items in their walk, many of which they fixed on the spot. Nina Stolar reports that her group contained Emeritus Directors Panofsky and Richter and current Director Dorfan, “And they all participated enthusiastically,” said Stolar, “which is a great example for the rest of the lab. I can’t wait until next year.”
Committee Members:
Ann Trautwein
Barbara Johnson
Brenda Warren
Cherrill Spencer
Dana Millican
Joli Steiber
Lesley Wolf
Lily Wong
Pauline Wethington
Sharon Burns
Susan Hoerger
Vern Smith
Victoria Sha

From Tech Pubs—Banners, Open House Poster:
Chip Dalby

SLAC Director Jonathan Dorfan gave the welcome speech and posed with the girls for this group photo.

Open House Leaders:
Jim Allan—Radiation Demonstration
John Weisskopt—Computer Building Tour
Gloria Labrador, Medical Tour
Pat Kreitz—Library Tour
Ruth McDunn—Technical Publications Q&A
Don Loquiao—Fire Station Tour
Denise Larsen—Machine Shop Demonstrations
Howard Rogers—Shark Key Chain and Cutting Metal with Wire

Security Staff, who produced 50+ picture badges within 30 minutes:
Dave Macias
Kim Gasper
Natalie Ayelsworth
Garry Cross

What's my line panelists:
Carol Morris, Health Physics Technician
Dana Millican, Mechanical Technician
Ruth McDunn, Web Information Manager
Nancy Yu, Engineer
Julia Thom, Physicist
Helen Nuckolls, Geologist

Workshop Leaders:
Magnetic Measurements—Zachary Wolf
Vacuum Science—Dave Bostic
Computer-Aided Drafting—Kurt Vallencourt
SSRL Electronics—Ramona Theobold
SSRL Electronics—Teresa Troxel
Radiation—Jim Allan
MCC—Sibylle Petrak
Electroplating Shop—Ali Farvid
Machine Shop—Denise Larsen

Parents who volunteered to be tour guides:
Boni Grimaldi
Ron Pacheo
Gerry Nelson Retires

IT WAS A DAY blessed by the gods: sunny with only a slight breeze blowing through the oak trees, and no wasps or bees. Family and friends gathered to say good-by to Gerry Nelson, the Accelerator Department’s Safety Officer, after 38 years of service. Retired friends came from far and near to share in this celebration along with co-workers, family and other friends. Bill Pierce ventured up from Palm Springs and Hal Smith came from Pioneer, California. Ken Crook, from his residence in Southern California, was present to wish Gerry as much retirement happiness as he is experiencing. Vern Price, who incidently claims to have been the one to hire Gerry as an operator, came out of retirement mode to share with the group what Gerry was like before he became Mr. Safety. It was particularly good to see Roger Anderson (Tiny) and Al Neubieser (Neuby), our very own Main Control Center guys who have remained in the area.

Gerry admits to being a real Stanford community family member. His professional career began in 1962. He met his wife Ruth Thor Nelson at Stanford, and they were married at Memorial Church. His son Erik is a Stanford graduate and his daughter Kristina is head of a division at the Medical School. Gerry’s first job was, naturally, on the Stanford Campus. He came to SLAC as an operator under Vern Price and later on in his career he worked in Safety under Ken Crook.

Gerry promises that when he finishes one of those vintage cars he’s working on, he’ll drop by and show it off. His wife, Ruth, will certainly thank him for freeing up the garage.

—Glenna Stewart

SLAC Document Wins Achievement Award

SLAC HISTORY IS EXCITING news! In April 1999 we published a brochure called Environment, Safety, and Health at SLAC. In December 1999 it won an Achievement Award in the Northern California Technical Communication Competition, sponsored by the Society for Technical Communication (STC). On February 26, 2000, Roxanne Jones went to the STC Awards Banquet in Sacramento to accept the Touchstone 99 achievement award.

Roxanne Jones, formerly lead technical writer of ES&H, now a production editor in Technical Publications, prepared the document with the help of technical writer Hillary Russak and several members of the ES&H Division. For their efforts, Russak and the ES&H staff members were recognized as contributors, sharing the award with Jones.

Comments from the judges about the brochure included: “Well put together report.” “Having seen several similar from both public and private sources, this is certainly one of the more approachable.” “Binding and cover are public-friendly within a limited budget.” “Clearly laid out and with a more readable style than many.”

Environment, Safety, and Health at SLAC, SLAC-I-720-0A86N-001, is an historical document describing the progress of environment, safety, and health issues at the laboratory since the establishment of the ES&H Division in 1990. It can be viewed on the ES&H website under Publications, ES&H brochure. While the 1999 brochure won the award, an updated version for 2000 is also available.

http://www.slac.stanford.edu/esh/esh.html

—Larissa Williams
SINCE I'M HELPING TO edit this month’s Interaction Point, I thought I might take a break from writing my Operating Safety Committee column. After all, everyone already knows how to be safe, don’t we?

In fact, our personal safety comes up against many challenges each day. Some of these challenges are caused by our own complacency, but others are directly linked to the behavior of others. Here’s an example of a note I received recently. “Bicycle safety is still an issue. A co-worker was almost run over on the Central Lab loading dock. The signs are too small and are ignored. Yesterday afternoon I saw someone riding a bike on the loading dock while wearing headphones.” The author of the note acknowledged that Security cannot be everywhere and that they do have other concerns to deal with through the day. He suggested that “enforcement of these low level rules could fall to other people, even if it is only the official ability to notify a supervisor of unsafe behavior.” That’s what I like—someone who points out not only the problem, but also presents a workable solution.

So my column this month exists because we can’t really take a break from safety, can we? And, for whatever power the written word gives, I hereby deputize you as readers to assist Security and the designated safety professionals on site to keep SLAC a healthy environment for all.

If you see an action that jeopardizes the safety of anyone (including yourself), tell the person performing the unsafe act. Or at least notify a supervisor (or UTR for contractors), so everyone can work toward preventing repeated violations. And also remember that help from the ES&H Division (via the Resource List pointers) and Security (x2551) is only a phone call away. We’ll all benefit from the fact that there are no vacations from safety!

—Janice Dabney
Chair
Operating Safety Committee